At a quarter before one o'clock, the Association took a recess, pursuant to order of Standing Committee reported this morning, and at one re-assembled, Prof. BACHE taking the Chair, and announcing the report of the Standing Committee as follows:

There will be an evening meeting to-morrow, at the South-Carolina Hall, at 6 P. M.; Lieut. MAURY's paper, on the Circulation of the Atmosphere, and Prof. BACHE's account of the measurement of the base line on Edisto Island, to be the subjects for the meeting.

The Chair also announced an invitation from Hon. M. KING and lady for to-morrow evening at 8 o'clock.

Dr. JAMES MOULTRIE was then requested to take the Chair, and Prof. TUOMEY laid before the Association a specimen of a fossil lacertain reptile, belonging to the genus *Leiodon*, from the cretaceous of Alabama. He mentioned the name of the discoverer of the specimen, Prof. SHERMAN, Howard College, Ala., and made remarks on the growth of the teeth, etc.

Prof. AGASSIZ said that he considered the discovery of this fossil, one of the most splendid additions to the Palæontology of the United States ever made, and that although several parts are yet wanting, it enables us to construct the animal completely.

Lieut. MAURY read his paper,

On the Currents of the Atlantic Ocean.

LIEUT. MAURY said that in studying the system of oceanic circulation he had found it necessary to set out with the very obvious and simple principle, viz: that from whatever part of the ocean a current was found to run, to the same part a current of equal volume was obliged to return.

Upon this principle was established the whole system of currents and counter-currents.

He also remarked that it was not necessary to associate with oceanic currents the idea that they must of necessity, as on land, run from a higher to a lower level.

So far from this being the case, some currents of the sea actually run up hill, while others run on a level.

The Gulf stream was of the first class. In a paper read before the National Institute in 1844 he had shewed that the bottom of the

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Gulf stream was an inclined plane, running upwards. If the Gulf stream was 200 fathoms deep in the Florida pass, and but 100 fathoms off Hatteras, it is evident that the bottom would be uplifted 100 fathoms within that distance, and, therefore, while the bottom of the Gulf stream was uphill, the top preserved the water-level, or nearly so.

The currents which run from the Atlantic into the Mediterranean, and from the Indian ocean into the Red sea, were the reverse of this. Here the bottom of the current was a water-level, and the top an inclined plane, running *down hill.*

Lieut. MAURY took the Red sea current as an illustration. That sea, he remarked, lies for the most part within a rainless and riverless district. It may be compared to a long and narrow trough.

Being in a rainless district, the evaporation from it is immense; none of which is returned to it by rivers.

It is about 1000 miles long; it lies nearly north and south, and extends from latitude 12° or 13° to the parallel of 30° north.

Lieut. MAURY was not able to state the daily rate of evaporation there; but he thought it might safely be assumed—and for the illustration he would assume it—at the rate of two-tenths (0.2 in.) of an inch a day.

Now, if we suppose the current which runs into that sea to average from mouth to head 20 miles a day—and this was conjectured merely for the purpose of illustration also—it would take the water fifty days to reach the head of it. If it lose two-tenths of an inch from its surface, by evaporation, it would appear, that by the time it reached the isthmus of Suez, it would have lost ten inches from its surface.

Thus the waters of the Red sea ought to be lower at the isthmus of Suez than they are at the straits of Babelmandel. They ought to be lower from two causes, viz: evaporation and temperature—for the temperature of that sea is necessarily lower at Suez, in latitude 30°, than at Babelmandel, in latitude 13°.

To make this quite clear, suppose the channel of the Red sea to have no water in it, and a wave ten feet high was to enter the straits of Babelmandel, and was to flow up this channel at the rate of twenty miles a day for fifty days, losing daily, by evaporation, two-tenths of an inch, it is easy to perceive that at the end of the fiftieth day it would not be so high, by ten inches, as it was the first day it commenced to flow.

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The top of that sea, therefore, is probably an inclined plane.

But the salt water, which has lost so much of its freshness by evaporation, becomes salter, and, therefore, heavier. The lighter water at the straits cannot balance the heavier water at the isthmus, and the colder and salter, and, therefore, the heavier water, must either run out as an under-current, or it must deposit its surplus salt in the shape of crystals, and thus gradually make the bottom of the Red sea a salt bed; or it must abstract all the salt from the ocean—and we know that neither the one process nor the other is going on. Hence we infer that there is from the Red sea an under or outer current, as from the Mediterranean, through the straits of Gibraltar.

And, to show why there should be an outer and under current from each of these two seas, the case was supposed of a long trough, opening into a vat of oil, with a partition to keep the oil from running into the trough. Now, suppose the trough be filled up with wine, on one side of the partition, to the level of the oil.

The oil is introduced to represent the lighter water, as it enters either of these seas from the ocean, and the wine the same water, after it has lost some of its freshness by evaporation, and, therefore, become salter and heavier.

Now, suppose the partition to be raised, what would take place? Why, the oil would run in as an upper-current, and the wine would run out as an under-current.

The rivers which discharge in the Mediterranean are not sufficient to supply the waste of evaporation—and it is by a process similar to this that the salt which is carried in from the ocean is returned to it again; were it not so, the bed of that sea would be a mass of solid salt.

The equilibrium of the seas is preserved by a system of compensations as exquisitely adjusted as those by which "the music of the spheres" is maintained.

Lieut. MAURY said he had also, on a former occasion, pointed out the fact, that, inasmuch as the Gulf stream was a bed of warm water, lying between banks of cold water, the warm water was lighter, and, therefore, the surface of the Gulf stream was in the shape of a double inclined plane, like the roof of a house, down which there was a shallow surface or roof current, from the middle, towards either edge of the stream.

This fact had been confirmed in a singular way: A person, who had been engaged on the Coast Survey, with observations on the

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Gulf stream, had informed the Lieutenant that when he tried the current in a boat, he found it sometimes one way and sometimes another, but scarcely ever in the true direction; whereas, the vessel, which drew more water, showed it to be constantly in one direction.

The object of the lecturer was, not to account for the currents of the Atlantic, but merely to mention the fact, that he might call the attention of the Association to it, that, though there be well-known currents which bring immense volumes of water *into* the Atlantic, we know of none which carry it out again, and which, according to the principle with which he set out, ought to be found running back from that ocean.

The La Plata and the Amazon, the Mississippi and St. Lawrence, with many other rivers, run into this very small ocean, and it is not probable that all of these waters are taken up from it again by evaporation; "yet the sea is not full." Where does the surplus go? The ice-bearing current, from Davis' straits, which is counter to the Gulf stream, moves an immense volume of water down towards the equator.

The ice-bearing current which runs from the Antarctic regions, and passes near Cape Horn into the Atlantic, and the Lagullas current, which sweeps into it around the Cape of Good Hope, both move immense volumes of water, and bear it along also towards the equator.

This water must get out again, or the Atlantic would be constantly rising.

A part of the Gulf stream runs around North Cape into the Arctic Ocean. The thermal charts of the Atlantic Ocean now in process of construction, under the direction of Lieut. MAURY, at the National Observatory, prove this, as also do the admirable charts of Prof. DOVE, of Berlin.

But the Lecturer proceeded to shew that this current probably performs its circuit of the Arctic Ocean, and returns to the Atlantic with increased volume.

There are the rivers of Northern Europe and all the great rivers of Asia and America, that empty into the Frozen Ocean, also the current from the Pacific Ocean, into Behring's Straits, all these sources of supply, serve, in the opinion of the Lieutenant, to swell the current down from Baffin's Bay through Davis' Straits into the Atlantic.

That there was an open water-communication sometimes at least

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from Behring's Straits to Baffin's Bay, had, Lieut. MAURY remarked, been all but proved by the results of investigations undertaken about two years ago, at the National Observatory, with regard to the habits, migrations, etc., of the Whale.

These researches were commenced under his direction by Lieut. HERNDON, and they were conducted in such a manner, as to show by a glance at the chart, in what parts of the ocean, and what months of the year, Whales had and had not been seen.

These investigations soon led to the discovery, that to the Right Whale, the Equator is as a wall of fire,—that that animal is never found near it, seldom or never within a thousand miles or more of it, on either side.

This fact induced Lieut. MAURY to enquire of the whalemen, whether the Right Whale of the Northern and of the Southern Hemispheres was the same animal.

The answer was "no." The Right Whale of the latter region, as described by these men, is a small pale animal, the largest scarcely yielding more than fifty barrels of oil. Whereas, that of the Northern region is a large dark animal, yielding frequently to the single fish upwards of two hundred barrels.

About this time the whale-ship Superior returned from a voyage through Behring's Straits, where she also found the Right Whale of the North Pacific.

This fact induced the further inquiry, as to whether the Right Whale of Behring's Straits and the Right Whale of Davis' Straits were the same animal. For since the fact has been established that the Right Whale of the North Pacific could not cross the Equator, and therefore could not get into the North Atlantic by either of the Capes, a reply in the affirmative to this inquiry would be another link in the chain of circumstancial evidence, going to prove the existence of a so called North-West Passage.

The answer from the whalemen in this instance, was, in effect, "we have not had an opportunity of comparing the two animals, except after long intervals, but, so far as we can judge, they are the same fish." So far as those other facts go, it would appear probable that there is, at times, at least an open water-communication between the two straits; for the instincts of the Whale, one might suppose, would prevent him from sounding under Icebergs, neither could he pass under barriers of great depth or breadth. Seeing that water runs through Behring's Straits from the Pacific, as well as

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around the Capes, into the Atlantic, where, therefore, was the escape-current from the Atlantic?

The Trade Winds, Lieut. MAURY was prepared to show, were the great evaporating winds. They were the winds, which, returning from the Polar regions, deprived of all the moisture which the hyperborean dew points could compress from them, first came in contact with the surface of the earth, and consequently with an evaporating surface, when they were first felt as trades, and where, therefore, they were dry winds.

Now could the vapor taken up by these winds so increase the saltness of this sea in the trade wind region, as to make the water there though warmer, yet specifically heavier, than that below, and also than that within the regions of the variable winds and of "constant precipitation?" If so, might we not have the anomaly of a warm under current in the South Atlantic Ocean, for that was the only place of escape for a counter current from the Atlantic?

Lieut. WALSH, who had been sent out by the Government, in the schr. *Taney*, to make certain observations in connection with Lieut. MAURY'S researches concerning the winds and currents of the Ocean had been instructed, among other things, to examine for such a current.

Remarks were made by Dr. A. A. GOULD, and Prof. AGASSIZ. The latter asked who now is to be regarded as the discoverer of the Southern Whale, mentioned by Lieut. MAURY, he who had pointed out the existence of a new species by careful investigation, of whatever kind, or he who shall first describe it zoologically. This case is a good lesson, said he, on the fancied importance of the name of the first describer.

Prof. W. H. HARVEY, of Trinity College, Dublin, then entertained the Association with observations on the Marine Flora of the Atlantic States. There exists a greater degree of similarity on the Marine Flora of the two sides of the Atlantic, than in their Marine Fauna, from the facility with which the spores of the Algæ may be transported to a great distance by natural agencies. But, from the rise of the isothermal lines on the European side, the species of low latitudes in America are similar to those of higher latitudes in Europe; those of Key West, for instance, in latitude 24°, are similar to those of the Mediterranean. It is not yet possible to mark out

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with precision the geographical distribution of the Algæ along the coast, but differences may be perceived in the Marine Flora of the region north of Cape Cod, that of Long Island Sound, that of Charleston Harbor, and that of Key West. The Flora of each of these regions was illustrated by numerous dried specimens of great beauty..

In reply to a question by Lieut. MAURY, whether the sargasso weed was found in the Pacific, and to one from Prof. BACHE, whether a marked change was not found at Cape Hatteras in the Flora of the Coast, Prof. HARVEY said that the present state of knowledge would not furnish answers to these questions.

Prof. BACHE said that these queries showed the advantage of a general meeting over sectional meetings, in cases where different branches of science touch closely on each other, as in the relation of currents to distribution of marine plants and animals. Prof. BACHE and Lieut. MAURY added interesting remarks on the Gulf stream and on the cold currents which run in connexion with it.

Adjourned at half past 2, to meet at 6 P. M.

LEWIS R. GIBBES, *Secretary.*

Third Day, Thursday, March 14, 1850.

EVENING SESSION.

PROF. BACHE took the Chair at half past six. Mr. JOHN BINNEY, of Boston, nominated by the Standing Committee, was elected a member.

Dr. ROBERT W. GIBBES was called to the Chair, and the first paper was read,

On the Comparative Reflecting Power of the planets Mars, Jupiter and Saturn; by Prof. LEWIS R. GIBBES, *of College of Charleston, S. C.*

AMONG the photometric problems that have been proposed, with relation to the light of the heavenly bodies, I do not know that the comparative reflecting power of the planets has yet found a place. My attention was called to the subject eight or ten years since at one of the oppositions of Mars, by the remark that Mars at that time was as bright as Jupiter at his opposition. In the absence of

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